



Editorial

Special issue on recent advances in soft computing in image processing[☆]

This special issue encompasses four papers devoted to the recent developments in the applications of soft computing techniques to image processing. The seed of the current issue were some of the presentations made in two special sessions organized in the conference FUZZ-IEEE 2006 as a part of the World Congress on Computational Intelligence 2006, that was held in Vancouver, Canada, July, 2006. The special sessions aimed at providing a collection of recent and state-of-the-art contributions on this exciting topic. Simultaneously, the fact that papers on this topic were presented in two special sessions facilitated the establishment and intensification of communication and international cooperation between researchers that were active in this area.

From the success of these special sessions, the editors decided to organize this special issue with the outstanding up-to-date works in the special sessions. At the same time, a call for contributions for the special issue was opened to give the chance to some other researchers to contribute to the special issue. After a hard review process four high quality works have been selected.

1. Recent advances in soft computing in image processing

Vision in general and images in particular have always played an important and essential role in human life. In the past they were, today they are, and in the future they will continue to be one of our most important information carriers. Nowadays, the field of image processing also has numerous commercial, scientific, industrial and military applications. All these applications result from the interaction between fundamental scientific research on the one hand, and the development of new and high-standard technology on the other hand.

In order to cope with the variety of image processing challenges, several techniques have been introduced and developed, quite often with great success. Among the different techniques that are currently in use, we also encounter soft computing techniques. Soft computing is an emerging field that consists of complementary elements of fuzzy logic, rough sets, neural computing, evolutionary computation, machine learning and probabilistic reasoning.

This Special Issue on “Recent Advances in Soft Computing in Image Processing” is dedicated to the special sessions of the same name organized at the FUZZ-IEEE 2006 conference. This yearly high-regarded conference presents a unique forum for researchers that are active in the fuzzy systems community, and includes both theoretical and practical contributions. Image processing is one of the established topics at the FUZZ-IEEE conferences and therefore it was quite natural that we took the initiative to organise special sessions on this topic at the 2006 edition. The organisation of these sessions was done in the framework of the soft computing in image processing (SCIP) working group.

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SCIP working group is an informal organisation that aims to establish and intensify international cooperation between researchers in the area of soft computing in image processing. It currently has over 170 members from 40 countries. One of the means to achieve the goals is the organisation of special sessions at international conferences. High-quality special issues of internationally established journals hold the key to further improve the dissemination of the recent advances in the field.

2. The papers in the special issue

As said, the papers in this issue include proposals from the FUZZ-IEEE special sessions, as well as some others from the open call to other researchers who wanted to contribute with outstanding works. After a hard review process four high quality manuscripts have been selected.

In the first paper, entitled “A Soft Computing-Based Approach to Spatio-Temporal Prediction”, R.E.O. Schultz, T.M. Centeno, G. Selleron, and M.R. Delgado propose a technique to predict the terrain landscapes state for a specific time, based on comparisons of preprocessed images whose originals are obtained from remote sensing images taken from specific regions in previous instants of time. More specifically, this paper aims at presenting an approach to evaluate a spatio-temporal prediction based on soft-computing techniques. The method considers the use of fuzzy reasoning associated with evolutionary techniques in digital image processing.

The contribution “Approximation by Shepard type pseudo-linear operators and applications to image processing” by B. Bede, E.D. Schwab, H. Nobuhara, and I.J. Rudas introduces an interesting study on pseudo-linear approximation operators from the practical point of view in image processing. It is shown that in several cases these operators outperform classical approximation ones based on sum and product operations.

S. Ghosh, S. Patra and A. Ghosh propose an unsupervised context-sensitive technique for change-detection in multitemporal remote sensing images using a modified Self-Organizing Feature Map Neural Network in the third contribution.

The last contribution to the issue, “Quality-Augmented Fusion of Level-2 and Level-3 Fingerprint Information using DS_m Theory”, has been developed by M. Vatsa, R. Singh, A. Noore, and M.M. Houck, and presents a novel fusion algorithm that recognizes fingerprint images with high accuracy under non-ideal conditions of unconstrained environments where neither the image quality nor the minimum number of features required can be guaranteed.

Finally, as guest editors of this special issue, we thank the editor-in-chief of the International Journal of Approximate Reasoning, Dr. Thierry Denoeux, and the area editor handling it, Dr. Oscar Cordón, for giving us the opportunity to guest-edit this issue. We would also like to thank the referees for their outstanding cooperation, and interesting comments and suggestions that helped to improve the final versions of the papers: Eugenio Aguirre, Oscar Camara-Rey, Jesus Chamorro, Olivier Colot, Sidharta Gautama, Peter Goebel, Mario Koeppen, Nalla Perumal Krishnan, Vincenzo Loia, Francesco Masulli, Eduard Montseny, Hajime Nobuhara, Daniel Sánchez, Luciano Sánchez, Gerald Schaefer, Pilar Sobrevilla, and Aureli Soria-Frisch. Of course, we also thank all the authors for their high quality contributions.

M. Nachtegaal

E. Kerre

Fuzziness and Uncertainty Modelling Research Unit, Department of Applied Mathematics and Computer Science, Ghent University, Krijgslaan 281 (Building S9), B-9000 Gent, Belgium

S. Damas

Applications of Fuzzy Logic and Evolutionary Computation Research Unit, European Centre for Soft Computing, Gonzalo Gutierrez Quirós s.n., 33600 Mieres, Asturias, Spain

D. Van der Weken

VRT – Research Innovation, August Reyerslaan 42, 1043 Brussel, Belgium

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